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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.
09/440,794	11/15/99	BAILEY III	A LAM1P128/P05

EXAMINER	
ANDERSON, M	
ART UNIT	**PAPER NUMBER**
1765	8

DATE MAILED: 09/10/01

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Please find below and/or attached an Office communication concerning this application or proceeding.

Commissioner of Patents and Trademarks

1- File Copy

PTO-90C (Rev. 2/95)

Office Action Summary	Application No. 09/440,794	Applicant(s) BAILEY III ET AL.
	Examiner Matthew A. Anderson	Art Unit 1765

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *25 June 2001* .

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-48* is/are pending in the application.

4a) Of the above claim(s) *1-30 and 46-48* is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *31-45* is/are rejected.

7)☐ Claim(s) *33-41* is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *11/15/99* is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

11)☐ The proposed drawing correction filed on _____ is: a)☐ approved b)☐ disapproved by the Examiner.

If approved, corrected drawings are required in reply to this Office action.

12)☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

13)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____ .

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

14)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).

a) ☐ The translation of the foreign language provisional application has been received.

15)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☒ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s) *4,5* .
4) ☐ Interview Summary (PTO-413) Paper No(s). _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: .

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Art Unit: 1765

DETAILED ACTION

Election/Restrictions

1. Claims 1-30, 46-48 are withdrawn from further consideration pursuant to 37 CFR 1.142(b), as being drawn to the nonelected Group I, there being no allowable generic or linking claim. Applicant timely traversed the restriction (election) requirement in Paper No. 7.

2. Applicant's election with traverse of Group II (claims 31-45) in Paper No. 7 is acknowledged. The traversal is on the ground(s) that no serious burden exists to the examiner. This is not found persuasive because a serious burden exists in the differing issues likely to arise during the prosecution of different statutory classes of invention.

The requirement is still deemed proper and is therefore made FINAL.

Claim Objections

3. Claims 33-41, are objected to under 37 CFR 1.75(c), as being of improper dependent form for failing to further limit the subject matter of a previous claim. Applicant is required to cancel the claim(s), or amend the claim(s) to place the claim(s) in proper dependent form, or rewrite the claim(s) in independent form. These method claims refer to claims 21 and 22 which were non-elected apparatus claims. Below, it

has been assumed that the claims refer to methods claims 31 and 32. This assumption forms the basis for the rejections which follow.

Claim Rejections - 35 USC § 103

4. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

5. Claims 31-35 are rejected under 35 U.S.C. 103(a) as being unpatentable over Lymberopoulos et al.(US 6,085,688) in view of Hills et al. (US 6,217,786 B1).

Lymberopoulos et al. discloses a method of and apparatus for producing a plasma for use in manufacturing microelectronics including etching of semiconductor wafers. The chamber shown in Fig 5 is azithmuthally symmetric around the center. The chamber holds the plasma as it is ignited and during the processing of the wafer since there is no separate plasma generation chamber. A window is disclosed in column 6 lines 8-35. The Rf antenna (i.e. a coil is shown in Fig. 5 as 110) is disposed above the plane defined by the wafer (i.e. substrate). Electromagnets (150a and 150B in Fig. 5) are disposed above the wafer . The magnets are disclosed as independently controllable conductors in the abstract and are used to control the plasma density and prevent non-uniform charge build-ups. By magnetically controlling the uniformity of

charge distribution, one of ordinary skill in the art would expect the uniformity of the etching to be controlled. This reads on the changing of the variation in the magnetic field to improve processing uniformity across the substrate. The wafer is placed in the chuck at the bottom of the reaction chamber and gas is flowed in to form a plasma.

Lymberopoulos does not explicitly disclose dc power to the electromagnets but dc is a known power supply configuration. Lymberopoulos silent as to the gas used in the etching process.

Hills et al. discloses etching a wafer and an oxide on that wafer using specified gases including fluorocarbons and inert carrier gases with Rf plasma. The specific fluorocarbons of C2F6, C3F6 and C4F8 or mixtures thereof were disclosed as were the carrier gases of Ar, He, Ne, Kr, Xe, or mixtures thereof . Oxygen and nitrogen gases as well as the hydrogen-containing additive gases CH4, H2, H2O, NH3 were also optionally present.

It would have been obvious to one of ordinary skill in the art at the time of the present invention to combine the method disclosure of Lymberopoulos et al. with that of Hills et al. because Lymberopoulos et al. discloses a Rf powered plasma etch process and chamber and Hills et al. discloses a etching gas useable in a Rf powered plasma processing chamber.

It would have been obvious to one of ordinary skill in the art at the time of the present invention to, in a chamber configured as disclosed in claim 31, to control the magnetic field in the region proximate the antenna to improve the processing uniformity across the substrate because Lymberopoulos et al. discloses such magnetic control and

such control would have been anticipated to produce an expected result of process uniformity.

It would have been obvious to one of ordinary skill in the art at the time of the present invention to flow the claimed listed gases into such an Rf plasma processing chamber because these gases were known to Hills et al. for Rf processing and their use would have been anticipated to produce an expected result .

6. Claims 36-41 are rejected under 35 U.S.C. 103(a) as being unpatentable over Lymberopoulos et al. and Hills et al. as applied to claims 31-35 above, and further in view of Kondo (US 6,254,966).

Lymberopoulos et al. and Hills et al. are described above.

Kondo et al. discloses a supporter for recording mediums which is made of (see col. 17 lines 55+) glass (a.k.a. amorphous silicon dioxide). The etching of the supporter is performed by dry etching. Plasma is known to those of ordinary skill as a dry etching process since gases are used to form the excited species therein. The gases used to etch include CHF_3, CF_4, C_2F_6, C_3F_8, NF_3, SF_6, C_2F_4, C_3F_6, C_4C_8, C_4F_{10}, C_5F_8, C_6F_{14}, C_3F_6O, C_9F_{10}, CF_3Br, CF_3I, C_2F_5I, CF_2Cl_2, $CFCl_3$, CH_2F_2, C_2HF_5, $C_2H_2F_4$, $C_2H_4F_2$, $C_2H_3F_3$, C_3HF^7, CF_3, $C_2H_2F_3$, $C_8H_3F_5$, Cl_2, CCl_4, $SiCl_4$, BCl_3, PCl_3, CCl_3F, BBr_3, CH_2Cl_2, and mixed gases thereof and other mixed gases containing oxygen, hydrogen, argon, He, N_2, Ne, Ar, Kr, Xe, O_3, CO, CO_2, H_2O, CH_4, C_2H_6, C_3H_8, C_4H_{10}, C_2H_4, C_3H_6, C_4H_8, C_2H_2, and C_3H_4.

It would have been obvious to one of ordinary skill in the art at the time of the present invention to combine Kondo et al. with the previous cited references because

Kondo et al. provides a more complete discussion of the gases used in plasma (i.e. dry etching) applications.

It would have been obvious to one of ordinary skill in the art at the time of the present invention to use the claimed listed gases in a plasma etching process because the claimed listed gases were known for plasma etching and their use in such an environment would have been anticipated to produce an expected result.

7. Claims 42-45 are rejected under 35 U.S.C. 103(a) as being unpatentable over Lymberopoulos et al. and Hills et al. as applied to claims 31-35 above, and further in view of Lu (EP 0821397 A2).

Lu et al. discloses a composite SiC that is used to form the chamber wall, chamber roof , collar around the wafer , grounding plane, and window for Rf radiation. The SiC is described as useful for reducing flaking (page 6 lines 35+). The surface after etching was smooth. And, as table 2 shows, the etch rate of the SiC was less than the commonly used quartz or Si.

It would have been obvious to one of ordinary skill in the art at the time of the present invention to form the processing chamber form a material such as SiC that does not substantially react with the reactive gases flown into the processing chamber because such a SiC chamber is suggested by Lu et al. and the use of such a material in such a manner would have been anticipated to produce an expected result . The examiner notes this reads on a chamber made entirely of SiC since Lu et al discloses walls roof and Rf window made of SiC.

Claim Rejections - 35 USC § 112

8. Claim 31 recites the limitation " said plasma processing system" in lines 7and 8.

There is insufficient antecedent basis for this limitation in the claim.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Matthew A. Anderson whose telephone number is (703) 308-0086. The examiner can normally be reached on M-Th, 6:30-5.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Benjamin Utech can be reached on (703) 308-3836. The fax phone numbers for the organization where this application or proceeding is assigned are (703) 305-3599 for regular communications and (703) 305-3599 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703)308-0661.

BENJAMIN L. UTECH
SUPERVISORY PATENT EXAMINER
TECHNOLOGY CENTER 1700

MAA
September 5, 2001